

## CLAIMS

1           1.       (original) A method, comprising:  
2           receiving one or more demands for service in a mesh network, which network comprises a  
3           plurality of nodes interconnected by a plurality of links; and  
4           mapping each of the one or more demands onto a primary path and a restoration path in the  
5           network to generate at least one path plan for the one or more demands in the network, wherein the  
6           at least one path plan is generated as a function of (a) one or more cost criteria associated with the  
7           at least one path plan and (b) a failure-related cross-connection criterion associated with the path  
8           plan.

1           2.       (original) The invention of claim 1, wherein the at least one path plan is generated  
2           by:  
3           calculating a first set of one or more path plans that satisfy the one or more cost criteria;  
4           calculating a second set of one or more path plans that satisfy the failure-related  
5           cross-connection criterion;  
6           determining whether the first and second sets have any path plans in common; and  
7           if not, then, until the first and second sets have at least one path plan in common, relaxing  
8           the one or more cost criteria and recalculating the first set.

1           3.       (currently amended) The invention of claim 2, wherein the failure-related  
2           cross-connection criterion specifies a maximum number of cross-connections that are changed in  
3           any node in the network following a failure in the network, wherein a path plan does not satisfy the  
4           failure-related cross-connection criterion if the number of failure-related cross-connections that are  
5           changed in any node in the path plan following a failure in the network exceeds the specified  
6           maximum number.

1           4.       (original) The invention of claim 2, wherein the one or more cost criteria are a  
2           function of at least one of sharing degree, administrative weight, link utilization, and available  
3           capacity.

1           5.       (original) The invention of claim 1, wherein the at least one path plan is generated  
2 by:

3           (a)       calculating a set of node-disjoint path pairs for the one or more demands based on the  
4 failure-related cross-connection criterion, wherein a node-disjoint path pair is calculated for each  
5 demand;

6           (b)       identifying primary and restoration paths for each node-disjoint path pair in the set  
7 to generate a path plan for the one or more demands;

8           (c)       determining whether the path plan satisfies the failure-related cross-connection  
9 criterion;

10          (d)       saving, when the path plan satisfies the failure-related cross-connection criterion, the  
11 path plan;

12          (e)       repeating steps (a)-(d) to generate two or more path plans that satisfy the  
13 failure-related cross-connection criterion; and

14          (f)       selecting one of the path plans based on the one or more cost criteria.

1           6.       (original) The invention of claim 5, wherein, when the path plan satisfies the  
2 failure-related cross-connection criterion, steps (b)-(d) are repeated with a constraint that excludes  
3 each and every saved path plan.

1           7.       (original) The invention of claim 6, wherein steps (b)-(d) are repeated only until the  
2 path plan fails the failure-related cross-connection criterion.

1           8.       (original) The invention of claim 5, wherein, when the path plan fails the  
2 failure-related cross-connection criterion, steps (a)-(d) are repeated with a constraint that excludes  
3 each set of node-disjoint paths.

1           9.       (currently amended) The invention of claim 8, wherein, when calculating a set of  
2 node-disjoint path pairs for the one or more demands per step (a) fails to find a feasible solution, the  
3 failure-related cross-connection criterion is relaxed and steps (a)-(e) are repeated using the relaxed  
4 failure-related cross-connection criterion.

1           10. (original) A path manager for a mesh communications network, the manager  
2 comprising one or more computing elements, wherein the manager is adapted to:

3           receive one or more demands for service in the mesh network, which network comprises a  
4 plurality of nodes interconnected by a plurality of links; and

5           map each of the one or more demands onto a primary path and a restoration path in the  
6 network to generate at least one path plan for the one or more demands in the network, wherein the  
7 at least one path plan is generated as a function of (a) one or more cost criteria associated with the  
8 at least one path plan and (b) a failure-related cross-connection criterion associated with the path  
9 plan.

1           11. (original) The invention of claim 10, wherein the at least one path plan is generated  
2 by:

3           calculating a first set of one or more path plans that satisfy the one or more cost criteria;

4           calculating a second set of one or more path plans that satisfy the failure-related  
5 cross-connection criterion;

6           determining whether the first and second sets have any path plans in common; and

7           if not, then, until the first and second sets have at least one path plan in common, relaxing  
8 the one or more cost criteria and recalculating the first set.

1           12. (currently amended) The invention of claim 11, wherein the failure-related  
2 cross-connection criterion specifies a maximum number of cross-connections that are changed in  
3 any node in the network following a failure in the network, wherein a path plan does not satisfy the  
4 failure-related cross-connection criterion if the number of failure-related cross-connections that are  
5 changed in any node in the path plan following a failure in the network exceeds the specified  
6 maximum number.

1           13. (original) The invention of claim 11, wherein the one or more cost criteria are a  
2 function of at least one of sharing degree, administrative weight, link utilization, and available  
3 capacity.

1           14.     (original) The invention of claim 10, wherein the at least one path plan is generated  
2 by:

3           (a)     calculating a set of node-disjoint path pairs for the one or more demands based on the  
4 failure-related cross-connection criterion, wherein a node-disjoint path pair is calculated for each  
5 demand;

6           (b)     identifying primary and restoration paths for each node-disjoint path pair in the set  
7 to generate a path plan for the one or more demands;

8           (c)     determining whether the path plan satisfies the failure-related cross-connection  
9 criterion;

10          (d)     saving, when the path plan satisfies the failure-related cross-connection criterion, the  
11 path plan;

12          (e)     repeating steps (a)-(d) to generate two or more path plans that satisfy the  
13 failure-related cross-connection criterion; and

14          (f)     selecting one of the path plans based on the one or more cost criteria.

1           15.     (original) The invention of claim 14, wherein, when the path plan satisfies the  
2 failure-related cross-connection criterion, steps (b)-(d) are repeated with a constraint that excludes  
3 each and every saved path plan.

1           16.     (original) The invention of claim 15, wherein steps (b)-(d) are repeated only until the  
2 path plan fails the failure-related cross-connection criterion.

1           17.     (original) The invention of claim 14, wherein, when the path plan fails the  
2 failure-related cross-connection criterion, steps (a)-(d) are repeated with a constraint that excludes  
3 each set of node-disjoint paths.

1           18.     (currently amended) The invention of claim 17, wherein, when calculating a set of  
2 node-disjoint path pairs for the one or more demands per step (a) fails to find a feasible solution, the  
3 failure-related cross-connection criterion is relaxed and steps (a)-(e) are repeated using the relaxed  
4 failure-related cross-connection criterion.

1           19.     (new) The invention of claim 10, wherein the failure-related cross-connection  
2 criterion specifies a maximum number of cross-connections that are changed in any node in the  
3 network following a failure in the network, wherein a path plan does not satisfy the failure-related  
4 cross-connection criterion if the number of failure-related cross-connections that are changed in any  
5 node in the path plan following a failure in the network exceeds the specified maximum number.

1           20.     (new) The invention of claim 1, wherein the failure-related cross-connection  
2 criterion specifies a maximum number of cross-connections that are changed in any node in the  
3 network following a failure in the network, wherein a path plan does not satisfy the failure-related  
4 cross-connection criterion if the number of failure-related cross-connections that are changed in any  
5 node in the path plan following a failure in the network exceeds the specified maximum number.